CLAIMS

What is claimed is:

1. A method for manufacturing a plastic ball grid array package, comprising

placing a heat spreader having an upper portion and a plurality of support arms into a mold cavity;

placing over the mold cavity a ball grid array including a semiconductor die mounted on a support surface of a substrate and connected to the substrate, such that lower ends of the support arms contact the support surface of the substrate peripheral to the die;

injecting molding material into the cavity to form the molding cap; and

permitting the molding material to harden to form a mold cap.

2. The method of claim 1 wherein the heat spreader is made of metal, and further comprising treating an undersurface of the metal heat spreader to form a black copper oxide layer prior to injecting the molding material.

3. The method of claim 2 wherein the treating comprises exposing a copper undersurface of the heat spreader with $NaClO_2$ to form a black copper oxide layer.

4. The method of claim 2 wherein the treating comprises exposing the copper undersurface of the heat spreader with $NaClO_2$ under conditions sufficient to form a black copper oxide layer having a thickness in the range 3 um to 15 um.

5. The method of claim 4 wherein the treating comprises exposing the copper undersurface of the heat spreader with $NaClO_2$ under conditions sufficient to form a black copper oxide layer having a thickness of 7 um.

6. The method of claim 1 wherein the heat spreader is made of metal, and further comprising treating an undersurface of the metal heat spreader to roughen the undersurface prior to injecting the molding material.

7. The method of claim 6 wherein the treating comprises micro-etching the copper undersurface of the heat spreader.

8. The method of claim 7 wherein the treating comprises micro-etching the copper undersurface of the heat spreader to a roughness in the range 0.5 um to 1.0 um.

9. The method of claim 8 wherein the treating comprises micro-etching the copper undersurface of the heat spreader to a roughness of 0.5 um.

10. A method for manufacturing a plastic ball grid array package, comprising

placing a heat spreader having an upper portion and a plurality of support arms onto the die support surface of a substrate such that at least one of the supporting arms of the heat spreader is affixed to the substrate using a resilient fixative such as an elastomeric adhesive;

placing a mold cavity over the heat spreader;

injecting the molding material into the cavity; and

permitting the molding material to harden to form a mold cap.

11. The method of claim 10 wherein the heat spreader is made of metal, and further comprising treating an undersurface of the metal heat spreader to form a black copper oxide layer prior to placing the heat spreader onto the die support surface of the substrate.

12. The method of claim 11 wherein the treating comprises exposing a copper undersurface of the heat spreader with $NaClO_2$ to form a black copper oxide layer.

13. The method of claim 11 wherein the treating comprises exposing the copper undersurface of the heat spreader with $NaClO_2$ under conditions sufficient to form a black copper oxide layer having a thickness in the range 3 um to 15 um.

14. The method of claim 13 wherein the treating comprises exposing the copper undersurface of the heat spreader with $NaClO_2$ under conditions sufficient to form a black copper oxide layer having a thickness of 7 um.

15. The method of claim 10 wherein the heat spreader is made of metal, and further comprising treating an undersurface of the metal heat spreader to roughen the undersurface prior to injecting the molding material.

16. The method of claim 15 wherein the treating comprises micro-etching the copper undersurface of the heat spreader.

17. The method of claim 16 wherein the treating comprises micro-etching the copper undersurface of the heat spreader to a roughness in the range 0.5 um to 1.0 um.

18. The method of claim 17 wherein the treating comprises micro-etching the copper undersurface of the heat spreader to a roughness of 0.5 um.